

**Summary of the Office Action**

**Objections to the Specification**

The specification is objected to for the informality of not listing the copending applications.

The specification is further objected to as failing to provide antecedent bass for the claimed subject matter limitation of "rotating portion of housing includes the light source and the means for detecting the light focused on the interior surface of the reformer tube" in claims 43 and 52.

**Claim Rejected under 35 USC § 112**

Claims 42, 49, 54 and 59-60 stand rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

**Claim Rejected under 35 USC § 102**

Claims 32-36, and 53-57 stand rejected under 35 USC § 102(b) as being anticipated by US Patent No. 4,305,661 issued to Pryor et al ('661).

Claims 37-52 and 58-60 stand rejected under 35 USC § 103(a) as being unpatentable over Pryor et al in view of Japanese Patent No. JP-403075544 issued to Nishimura et al ('544).

**Summary of the Response to the Office Action**

The Examiner is thanked for the thorough and complete review of the Application and Applicant has amended the specification to include the copending applications as requested.

Claims 32, 33, 36-37, 42-43, 45, 47, 51, 53 and 59 have been amended to over come the Examiner's rejections. Claim 54 has been canceled. Therefore, claims 32-53 and 55-60 are presently pending in this application.

Claims 42, 49, 54 and 59-60 have been amended to overcome the 35 USC § 112, second paragraph rejection.

Applicants traverse the improper antecedent basis objection with respect to the "rotating portion of housing includes the light source and the means for detecting the light focused on the interior surface of the reformer tube" in claims 43 and 52.

**IN THE SPECIFICATION:**

Please add the following paragraph to the specification after the title of the invention.

The present patent application is related to our co-pending applications entitled "A Method For Reformer Tube In Situ Inspection Radius Calculation," U.S. Application No. 10/707,630 filed 12/25/2003 and "A Method For Processing In Situ Inspection Reformer Tube Data" U.S. Application No. 10,707,629 filed 12/25/2003.

**LISTING OF CLAIMS**

32. (amended) A device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities comprising:

a housing, wherein the housing further includes:

a light source;

means for focusing the spot of light source on an interior surface of said reformer tube;

means for detecting a reflected spot of light from the light source focused on the interior of said reformer tube; and

means for moving the housing through said reformer tube.

33. (amended) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 32, wherein said focusing means includes a device for projecting a focused [[ring]] spot of light on an interior surface of said reformer tube.

34. (previously presented) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 32, wherein the focusing means further includes a substantially conical mirror for projecting the light beam onto the interior surface of the reformer tube.

35. (previously presented) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 34, wherein the conical mirror has a parabolic shape for projecting and focusing the light beam onto the interior surface of the reformer tube.

36. (amended) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 35, wherein the detecting means is capable of measuring a position of the reflected spot of light as it moves across the detecting means from the interior of the reformer tube surface relative to a field of view of the detecting means.

37. (amended) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 36, wherein a field of view of the of the detecting means is positioned such that the field of view of the detecting means minimizes the amount of reflected spot of light collected from the reformer tube surface that was scattered from the housing.

38. (previously presented) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 37, wherein the detecting means is one of a position sensitive photo detector (PSD), a lateral effect photo diode detector, a photo diode array detector, a CMOS array detector, a charge-coupled device (CCD) detector and a pixelized array detector.

39. (previously presented) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 38, wherein the detecting means is one of a 1-dimensional and 2-dimensional detector.

40. (previously presented) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 39, wherein said abnormalities are at least one of manufacturing defect, metal dusting and creep.

41. (previously presented) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 40, wherein the housing is adapted for use in a reformer tube by preventing chemical interaction with the inside surface of said tube.

42. (amended) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 41, wherein the housing is constructed so that surfaces which ~~[[may potentially contact]]~~ are capable of contacting the interior of said tube are constructed out of nonmetallic materials.

43. (amended) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 32, wherein said means for focusing the light source on the surface of said tube further includes,

a rotating portion of the housing, wherein the rotating portion of housing includes the light source and the means for detecting the ~~spot of~~ light focused on the interior surface of said reformer tube.

44. (previously presented) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 43, wherein a field of view of the of the detecting means is positioned such that the field of view of the detecting means minimizes the amount of reflected light collected from the reformer tube surface that was scattered from the housing.

45. (amended) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 44, wherein the detecting means is capable of measuring a position of the reflected ~~spot of~~ light from the interior of the reformer tube surface relative to a field of view of the detecting means.

46. (previously presented) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 45, wherein the detecting means is one of a position sensitive photo detector (PSD), a lateral effect photo diode detector, a photo diode array detector, a CMOS array detector, a charge-coupled device (CCD) detector and a pixelized array detector.

47. (previously presented) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 46, wherein the detecting means is one of a 1-dimensional and 2-dimensional detector.

48. (previously presented) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 47, wherein said abnormalities are at least one of manufacturing defect, metal dusting and creep.

49. (amended) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 47, wherein ~~[[said]]~~ high speed operation is achieved by using a material that is substantially lighter than metal for the body of said device.

50. (previously presented) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 49, wherein the housing is adapted for use in a reformer tube by preventing chemical interaction with the inside surface of said tube.

51. (amended) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 50, wherein the housing is constructed so that surfaces which ~~[[may potentially contact]]~~ are capable of contacting the interior of said tube are constructed out of nonmetallic materials.

52. (previously presented) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 32, wherein said means

for focusing the light source on the surface of said tube further includes,

a rotating portion of the housing, wherein the rotating portion of housing includes the light source.

53. (amended) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 32, wherein the detecting means is capable of measuring a position of the reflected spot of light from the interior of the reformer tube surface relative to a field of view of the detecting means.

54. (canceled) [[The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 53, wherein the detecting means is capable of measuring a position of the reflected light from the interior of the reformer tube surface relative to a field of view of the detecting means.]]

55. (previously presented) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 54, wherein the detecting means is one of a position sensitive photo detector (PSD), a lateral effect photo diode detector, a photo diode array detector a CMOS array detector, a charge-coupled device (CCD) detector and a pixelized array detector.

56. (previously presented) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 55, wherein the detecting means is one of a 1-dimensional and 2-dimensional detector.

57. (previously presented) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 56, wherein said abnormalities are at least one of manufacturing defect, metal dusting and creep.

58. (previously presented) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 57, wherein the housing is adapted for use in a reformer tube by preventing chemical interaction with the inside

surface of said tube.

59. (amended) The device for inspecting the interior of a reformer tube used in chemical processing for the presence of abnormalities according to Claim 58, wherein the housing is constructed so that surfaces which ~~[[may potentially contact]]~~ are capable of contacting the interior of said tube are constructed out of nonmetallic materials.

60. (amended) The device for inspecting the interior of metal tubes used in chemical processing for the presence of abnormalities according to Claim 58, wherein ~~[[said]]~~ high speed operation is achieved by using a material that is substantially lighter than metal for the body of said device.

#### **REMARKS**

Applicants traverse the objection to the specification regarding the "rotating portion of housing includes the light source and the means for detecting the light focused on the interior surface of the reformer tube" in claims 43 and 52. Applicants draw the Examiner's attention to Figure 3, wherein the applicants point out that the double line just to the left and below reference numeral 36 represents a slip ring and separates the front of the probe and allows it to rotate unencumbered. The specification at points out at page 11 lines 3-4 states that the rotating optical head 30 is mounted to body 31. Thus, a review of Figure implies that a slip ring must lie between the rotating head 30 and body 31 as described above.

Therefore, applicants respectfully request that this objection be withdrawn at this time.

Applicants assert that the Pryor et al reference does not read on or renders the present invention obvious either taken alone or in combination with the Nishimura et al reference. The Pryor reference requires that a ring of light be focused on the detector and thus requires a 2-dimentional array. Furthermore, based on the necessity of the 2-dimensional array the resolution of the Pryor reference does not come close the approaching the resolution of the present invention.

Moreover, the present invention focuses a spot of light on a 1-dimensional or 2-dimentional detector as the spot of light sweeps back and forth across the array. The Pryor nor the Nishimura reference either taken alone or in combination neither suggests or teaches this

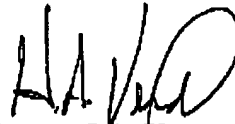
limitation.

Based upon the amendments to the claims and the rationale stated above, Applications respectfully request the withdrawal of all objections and rejections and the timely allowance of all pending claims.

**Conclusions**

In view of the foregoing, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

Respectfully submitted,



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